

FAUNISTIC COMPARISON OF ADULT COLEOPTERA RECOVERED FROM CATTLE AND SHEEP MANURE IN EAST-CENTRAL SOUTH DAKOTA¹

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Manure has long been recognized as an inviting habitat for many arthropod species. The bulk of investigations have involved the fauna and ecology of those species which prefer bovine manure (Kessler and Balsbaugh 1972), however, there have been some scattered investigations of the insect fauna associated with sheep manure (Pratt 1912, Brown 1927, Wilson 1932, Seamans 1934, Mohr 1943, Landin 1961, and Rainio 1966) and human feces (Miller 1954). While the arthropod fauna of each type of dung has been established, limited information has been reported on the comparisons of adult Coleoptera recovered from sheep and cattle manure from similar environmental conditions. This paper is concerned with just such a faunistic comparison conducted during 1969 in east-central South Dakota.

METHODS AND MATERIALS

The test site was located in Brookings County, South Dakota. Adult Coleoptera were collected from bovine manure as described by Kessler and Balsbaugh (1972). Fresh sheep manure (24 - 96 hr old) was collected from a pasture every 7th day from June 18 - September 10. Each collection period, 2.85 cc of sheep manure was placed into a Berlese funnel for 24 hr. The insects thus extracted were collected and stored in 70% ethyl alcohol for identification.

RESULTS AND DISCUSSION

Twenty-four species of adult Coleoptera were recovered from sheep dung, while 38 species were collected from bovine dung (Table 1). The weekly recovery of each species from sheep and cattle dung during the test period is shown in Table 2. No attempt is made to discuss seasonal occurrence from only 1 year's data.

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HISTERIDAE: *Hister abbreviatus* F. adults were recovered from both sheep and cattle manure while *H. americanus* Paykull and *Phelister subrotundus* Say were collected from only bovine manure. Members of this family accounted for less than 0.5% of the beetle population in both dung habitats.

HYDROPHILIDAE: Nine species, including *Cryptopleurum minutum* (F.), *Sphaeridium lunatum* F., *S. scarabaeoides* L., *S. bipustulatum* F., *Cercyon pygmaeus* (Illiger), *C. quisquilius* L., *C. unipunctatus* (L.), *C. lateralis* (Marsham), and *C. praetextatus* (Say), were recovered from cattle dung, while the 1st 7 of these species were recovered from sheep manure. Adults of this family constituted 46.40% of the beetle population found in bovine manure vs. only 5.86% in sheep dung. This difference in population percentage may be explained partially by the hydrophilids' preference for the moist environment of the cattle excrement rather than the relatively dry sheep manure.

SCARABAEIDAE: Fourteen species of adult Scarabaeidae were collected from cattle manure. These included *Onthophagus hecate* Panzer, *O. pennsylvanicus* Harold, *Ataenius spretulus* (Harold), *Aphodius haemorrhoidalis* (L.), *A. granarius* (L.), *A. fimetarius* (L.), *A. vittatus* Say, *A. ruricola* Melsheimer, *A. fossor* (L.), *A. prodromus* (Brahm), and *Copris tullius* Olivier. The 1st 9 of these species were recovered from sheep dung. However, these 9 were the most prevalent species in both types of manure. The scarabs comprised 16.59% and 25.15% of the adult Coleoptera in cattle and sheep dung, respectively. *A. granarius* apparently was highly attracted to sheep manure.

STAPHYLINIDAE: Six species, including *Platystethus americanus* Erichson, *Falagia dissecta* Erichson, *Oxytelus suspectus* Casey, *Aleochara bipustulata* L., *Philonthus cruentatus* Gravenhorst, and *P. rectangularis* Sharp, were collected from both sheep and cattle dung. Six additional species, *P. umbrinus* Gravenhorst, *P. varians* (Paykull), *A. bimaculata* Gravenhorst, *Oxyopoda sagulata* Erichson, *Gyrohyphus obsidianus* (Melsheimer), and *Ontholestes cingulatus* Gravenhorst, were recovered only from bovine manure. The staphylinids comprised approximately 37% and 68%, respectively, of the beetles recovered from cattle and sheep manure. Over 65% of the adult beetles collected from sheep manure was *P. americanus*. This species was also most prevalent in bovine dung, comprising 22% of the total population. Staphylinids appeared to be attracted to the drier manure, as were the scarabs.

All 24 species of Coleoptera found in sheep manure were also recovered from cattle excrement. Only 2 species, *O. sagulata* and *C. lateralis*, which were found regularly in bovine manure were absent from sheep manure. The adult coleopterous fauna of sheep and cattle manure is very similar, however, population distribution appears to be dependent on the habitat preference of each species and microenvironmental conditions of the dung.

Landin (1961) found little difference in the species composition of sheep and cow dung on Fargo Island in the Baltic, and stated that temperature and humidity are 2 of the most important environmental factors affecting insects. He contended that within any particular geographic area, the microclimatic conditions of the dung, rather than the kind of manure, determines the species composition. We feel that Landin was correct in this contention.

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Species	Cattle Manure		Sheep Manure	
	Total No.	Percent	Total No.	Percent
HISTERIDAE				
<i>Hister abbreviatus</i> F.	20	.18	1	.04
<i>Phelister subrotundus</i> Say	31	.28	0	0
<i>Hister americanus</i> Paykull	1	.01	0	0
HYDROPHILIDAE				
<i>Sphaeridium lunatum</i> F.	521	4.66	22	.96
<i>Sphaeridium scarabaeoides</i> L.	428	3.83	28	1.23
<i>Sphaeridium bipustulatum</i> F.	294	2.63	9	.39
<i>Cercyon pygmaeus</i> (Illiger)	2262	20.43	46	2.01
<i>Cercyon quisquilius</i> L.	1278	11.43	25	1.09
<i>Cercyon lateralis</i> (Marsham)	136	1.22	0	0
<i>Cercyon unipunctatus</i> (L.)	19	.17	2	.09
<i>Cercyon praetestatus</i> (Say)	1	.01	0	0
<i>Cryptopleurum minutum</i> (F.)	247	2.21	2	.09
SCARABAEIDAE				
<i>Onthophagus hecate</i> Panzer	315	2.82	45	1.97
<i>Onthophagus pennsylvanicus</i> Harold	43	.38	10	.43
<i>Aphodius haemorrhoidalis</i> (L.)	824	7.37	47	2.12
<i>Aphodius granarius</i> (L.)	297	2.66	356	15.59
<i>Aphodius fimetarius</i> (L.)	139	1.24	6	.26
<i>Aphodius vittatus</i> Say	45	.40	13	.57
<i>Aphodius distinctus</i> (Muller)	18	.16	18	.79
<i>Aphodius ruficola</i> Melsheimer	24	.21	60	2.63
<i>Aphodius coloradensis</i> Horn	19	.17	0	0
<i>Aphodius stercorosa</i> Melsheimer	11	.10	0	0
<i>Aphodius fossor</i> (L.)	10	.09	0	0
<i>Aphodius prodromus</i> (Brahm)	1	.01	0	0
<i>Copris tullius</i> Olivier	7	.06	0	0
<i>Ataenius spretulus</i> (Harold)	103	.92	18	.79
STAPHYLINIDAE				
<i>Platystethus americanus</i> Erichson	2466	22.06	1491	65.31
<i>Falagria dissecta</i> Erichson	797	7.12	21	.91
<i>Oxyroda sagulata</i> Erichson	412	3.70	0	0
<i>Oxytelus suspectus</i> Casey	5	.04	5	.22
<i>Aleochara bipustulata</i> L.	40	.36	33	1.45
<i>Aleochara bimaculata</i> Gravenhorst	17	.15	0	0
<i>Philonthus cruentatus</i> Gravenhorst	162	1.45	1	.04
<i>Philonthus umbrinus</i> Gravenhorst	25	.22	0	0
<i>Philonthus rectangularis</i> Sharp	40	.36	1	0
<i>Philonthus varians</i> (Paykull)	13	.12	0	0
<i>Gyrohyphus obsidianus</i> (Melsheimer)	1	.01	0	0
<i>Ontholestes cingulatus</i> Gravenhorst	1	.01	0	0
Aleocharinae	103	.92	23	1.01
Xantholinini	2	.02	0	0
Total	11,178	100.01	2,283	100.03

Table 1. Adult Coleoptera recovered, 1969, from cattle and sheep manure in east central South Dakota.

Species	June		July					August				September	
	18	25	2	9	16	23	30	6	13	20	27	3	10
Histeridae													
<i>H. abbreviatus</i>	C ^a	-	C	-	C	-	C	C	C	C	C	C	C
<i>P. subrotundus</i>	-	-	-	-	-	-	C	C	C	C	C	C	C
<i>H. americanus</i>	-	-	-	-	-	-	-	C	-	-	-	-	-
Hydrophilidae													
<i>S. lunatum</i>	C	C	C	C	C&S	C&S	C&S	C	C	C	C	C	C
<i>S. scarabaeoides</i>	C	C	C	C	C&S	C&S	C	C	C	C	C	C	C
<i>S. bipustulatum</i>	C	C	C	C	C&S	C&S	C	C	C	C	C	C	C
<i>C. quisquilius</i>	C	C	C	C	C&S	C&S	C	C	C&S	C&S	C	C&S	C&S
<i>C. pygmaeus</i>	C	C	C	C	C&S	C&S	C&S	C	C&S	C	C	C	C
<i>C. lateralis</i>	-	-	-	C	C	C	C	C	C	C	C	C	C
<i>C. unipunctatus</i>	-	-	-	-	C	-	C	-	C	C&S	C	C&S	C
<i>C. praetextatus</i>	-	-	-	-	C	-	-	-	-	-	-	-	-
<i>C. minutum</i>	C	C	C	C	C	C	C	C	C	C	C	C	C&S
Scarabaeidae													
<i>O. hiccata</i>	C	C	C	C	C&S	C&S	C	-	C&S	C&S	C	C	C&S
<i>O. pennsylvanicus</i>	C	C	C	C	C&S	C&S	C	C	C	C	C	C	C
<i>A. haemorrhoidalis</i>	C	C	C	C&S	C&S	C	C	C	C	C	C	C	C&S
<i>A. vittatus</i>	C	C	C	C&S	C	C	C	-	-	-	-	-	-
<i>A. coloradensis</i>	C	C	C	C	C	-	-	-	-	-	-	-	-
<i>A. fossor</i>	C	C	C	C	C	-	-	-	C	C	C	-	-
<i>A. distinctus</i>	C	C	C	C	-	-	-	-	C	C	C	C	C
<i>A. fimetarius</i>	C	C	C	C	C&S	C	C	-	C	C	C	C	C
<i>A. ruricola</i>	C&S	C&S	C&S	C&S	C&S	C	C&S	C	C	C&S	C	C	C
<i>A. granarius</i>	C&S	C&S	C&S	C&S	C&S	C&S	C	C&S	C&S	C&S	C	C&S	C
<i>A. prodromus</i>	-	-	C	-	-	-	-	-	-	-	-	-	-
<i>A. stercorosa</i>	-	-	-	C	-	C	C	C	C	C	C	C	-
<i>C. tullius</i>	C	C	C	C	-	-	-	-	-	-	-	-	C
<i>A. spretulus</i>	-	S	-	S	-	-	C	C	C	C	C	C&S	C
Staphylinidae													
<i>F. dissecta</i>	C	C	C	C	C&S	C	C&S	C	C&S	C&S	C	C	C
<i>P. americanus</i>	C&S	C&S	C	C&S	C&S	C&S	C&S	C&S	C&S	C&S	C&S	C&S	C&S
<i>O. sagulata</i>	C	C	C	C	C	C	C	C	C	C	C	C	C
<i>O. cingulatus</i>	-	-	-	-	-	-	-	C	-	-	-	-	-
<i>P. cruentatus</i>	C	C	C	C	C&S	C	C	C	C	C	C	C	C
<i>P. varians</i>	-	-	-	C	C	C	C	C	C	C	C	C	C
<i>P. umbrinus</i>	-	-	-	C	C	C	C	C	C	C	C	C	C
<i>P. rectangularis</i>	-	-	-	C	C	C	C	C	C	C&S	C	C	-
<i>A. bimaculata</i>	-	-	C	C	C	C	-	C	C	C	C	C	C
<i>A. bipustulata</i>	-	C	C	C	C&S	C&S	C&S	C	C&S	C	-	C	C
<i>G. obsidianus</i>	-	-	-	-	-	C	-	-	-	-	-	-	-
<i>O. suspectus</i>	-	-	-	-	-	-	-	S	C	C	C	C	C

^aRecovered from:

C = Cattle Manure

S = Sheep Manure

Table 2. Occurrence of adult Coleoptera in cattle and sheep manure, 1969, in east central South Dakota

REFERENCES CITED

- BROWN, W. J. 1927. An annotated list of the coprophagous Scarabaeidae known to occur in Oklahoma. Proc. Oklahoma Acad. Sci. 7(29):24-28
- KESSLER, H. and E. U. BALSBAUGH, Jr., 1972. Succession of adult Coleoptera in bovine manure in east central South Dakota. Ann. Entomol. Soc. Am. 65:1333-6.
- LANDIN, B. O. 1961. Ecological studies on dung-beetles (Col. Scarabaeidae). Opusc. Entomol. Suppl., 19:1-227
- MILLER, A. 1954. Dung beetles (Coleoptera, Scarabaeidae) and other insects in relation to human feces in a hookworm area of Southern Georgia. Am. J. Trop. Med. Hyg. 3:372-388.
- MOHR, C. O. 1943. Cattle droppings as ecological units. Ecol. Monogr. 13:275-98.
- PRATT, F. C. 1912. Insects bred from cow manure. Canadian Entomol. 44:180-4.
- RAINIO, M. 1966. Abundance and phenology of some coprophagous beetles in different kinds of dung. Ann. Zool. Fenn. 3:88-98.
- SEAMANS, H. L. 1934. An insect weather prophet. Ann. Rept. Quebec Soc. Protect. Plants, p. 111-7.
- WILSON, J. W. 1932. Coleoptera and Diptera collected from a New Jersey sheep pasture. J. New York Entomol. Soc. 4:77-93.

ABSTRACT—A comparison of the adult Coleoptera present in both sheep and cattle manure was made in east-central South Dakota during 1969. Totals of 24 and 40 species of beetles were recovered from sheep and cow excrement, respectively. All species collected from sheep dung were also found in bovine manure. Beetles of the families Histeridae, Hydrophilidae, Scarabaeidae, and Staphylinidae were present. *Platystethus americanus* Erichson was the most prevalent adult beetle recovered from both types of manure. Individuals of this species accounted for 22.06% and 65.31%, respectively, of the Coleoptera identified from bovine and sheep excrement. — Howard Kessler, U. S. Environmental Protection Agency, Pesticide Branch, 1421 Peachtree Street, NE, Atlanta, Georgia, 30309; Edward U. Balsbaugh, Jr. and Burruss McDaniel, Entomology-Zoology Department, South Dakota State University, Brookings, South Dakota 57006.

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